

FAST.Q - FEEDBACK AND ANSWER SYSTEM TECHNOLOGY FOR QUESTIONS

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Abstract

As is common in the standard lecture format, students rarely ask questions when seeking clarification or further understanding of a topic. Whatever the underlying reason for this may be, it certainly poses a problem for the lecturers delivering these lectures due to the difficulty in determining the cohorts' current understanding of the materials. This paper presents a system (FAST.Q) designed to encourage students to feel more able and comfortable to ask questions and provide lecture feedback in real-time, allowing the lecturer to answer these questions for the benefit of the student and the whole class. In this paper the prototype system is presented, with the feedback of the initial trials. The usability and applicability of the system is then presented and evaluated.

Keywords: LNCD, Student as Producer, Feedback, Education, Technology.

1 INTRODUCTION

As is common amongst educational institutions, lectures are usually scheduled for 1 hour sessions. In this time, module content required by the students has to be transferred in such a way that the lecturer is confident the student has taken in and understood the materials being presented. Atherton [1] states that "*a lecture is the process by which the notes of the lecturer become the notes of the student without passing through the mind of either*". This is a situation that can be considered familiar by anyone who has been in this situation, especially if at any point the content of the session is not fully understood. This is reinforced by Bligh [2] who postulates "*student attention rapidly decreases over time*". This is something every lecturer can relate to and leads to the question: 'How can we assess the minds of the students [to ensure understanding], whilst keeping them engaged?'.

One particular method of maintaining student engagement within a lecture is to change from the traditional lecture format, to one that promotes and encourages student engagement. Indeed many people have tried to modify this traditional lecture format to something more conducive to the learning needs of the student. Allison [3] proposed a mechanism by which the traditional format was split into two 75-minute sessions, one for formal lecturing and the other dedicated to being a 'learning day' focused on working through problems in small groups.

Another, more interactive approach demonstrated by Khan *et al* [4] was to move completely from the didactic traditional lecture format to a more interactive game (Jeopardy) format. This would allow the students to answer questions in a quiz-like fashion, with their knowledge retention being measured post-game. The results of this change in lecture format show promising results in students' knowledge and retention in post-game tests, clearly demonstrating that changes in format can improve engagement and learning.

Whilst these methods have shown that they can improve student knowledge retention, engagement and satisfaction, it is sometimes difficult to change the mode of delivery from the traditional lecture format. This difficulty in mode / delivery change could be due to many factors such as the result of staff-student ratios or indeed the need to convey large amounts of information to large groups of students. As a result, the methods and changes proposed by researchers such as Allison [3] and Khan *et al* [4] would still be unable to address problems faced by traditional lecture formats. Indeed these changes in format would still fall short in the issues being addressed in this paper.

1.1 To ask or not to ask, is that a question?

One of the most instant and easiest methods to check understanding is simply to periodically ask the students if they have any questions or queries regarding the material being delivered. Unfortunately,

this simple task is fraught with its own issues since, as any lecturer will know, students are renowned for not asking questions in a lecture.

Indeed, this is a scenario faced many times before and as such Gorsuch [5] suggests that [language] teachers should have their students listen to a line of text from a classroom language tape, requiring them to transcribe what they hear. If students do not ask any clarification questions then the teacher should continue with the tape. What is suggested here is that students will quickly find themselves falling behind, therefore being forced to ask the teacher for help. Gorsuch goes on to demonstrate how this dictation method can be used to demonstrate to students that questions can be asked at any point. If students miss the beginning of the sentence "Learning a foreign language is fun", then they can simply substitute the word 'something' or the interrogative 'what' in its place and therefore ask "what is fun?" as opposed to asking the speaker to repeat the entire sentence again.

Demonstrating the importance for asking questions to students is sometimes outweighed by the negative effects of students not wishing to show, at least to their peers, a lack of understanding, however misplaced this may be. When asking "does everyone understand?", this question is usually greeted with a few nodding heads or mutterings.

Internet forums such as CollegeNET.com contain hundreds of comments from students and lecturers on why they feel students do not ask questions in lectures. Reading these comments it would seem there are several reasons, from more positive issues such as 'the students may indeed understand' to cultural reasons such as Asian students not wishing to cause offense to their teacher [6]. However, it would appear that the most overriding reason that has emerged from reading these forum groups is due to fear and embarrassment. Students can sometimes feel their questions may be trivial, or indeed that they are the only ones not understanding and as such would not wish to appear "*stupid*" to their peers. What does not seem apparent to students in these situations is that maybe the subject material hasn't been explained in enough detail, or in fact the majority of the class also don't understand. As such it is certainly important for student understanding that material is pitched at the correct level to be understood, however it is as equally important that students seek clarification and feedback to their lecturers whenever possible.

1.2 Student as Producer

At the University of Lincoln, UK, academics and pedagogical researchers are running an initiative known as Student as Producer. Student as Producer is part of Lincoln's policy of promoting research-informed teaching and research-engaged teaching. As part of this policy change the university is promoting the incorporation of research and research-like activities into the undergraduate curriculum.

As a result of Student as Producer, it is even more important to increase student engagement and increase the number of students asking questions. As Student as Producer is underpinned by progressive pedagogical theory, it asserts that students can and should be producers of their social world by collaborating in the process of research and research-informed teaching and learning. Student as Producer has a radically democratic agenda, valuing critique, speculative thinking, openness and a form of social learning that aims to transform the social context so that students become the subjects rather than objects of history - individuals who make history and personify knowledge.

Student as Producer is not simply a project to transform and improve the 'student experience' but aspires to a paradigm shift in how knowledge is produced, where the traditional student and teacher roles are 'interrupted' through close collaboration and a recognition that both teachers and students have much to learn from each other. Student as Producer is not dependent on technology but rather on the quality of the relationship between teacher and student. The extent to which technology can support, advance and even progressively disrupt this relationship is the preliminary focus behind this paper. However, a precursor to this shift in paradigm is the need to make students more comfortable in their desire to inquire and seek answers to their questions.

1.3 Technology in the classroom

Using technology in the classroom to engage students in lectures and associated materials is certainly nothing new [7-9]. Indeed, electronic voting systems have been available for many years. Fig. 1 shows a system known as Optivote (www.optivote.com) which allows students to provide reactive responses to questions asked by the lecturer. These systems are based on pre-written questions and are more

than often used as a mechanism for gaining student opinions or for the purpose of formative assessment.

As previously discussed, these are reactive systems and only allow the participant to make a choice from a selection of options based on a predetermined question. For example, in Fig. 1, the question asks the student to select from a possible four answers (by pressing either A, B, C or D on their hand units) what type of instrument they think an accordion is. This type of system has a twofold purpose. Firstly, it allows the assessor to get a feeling for the current level of knowledge of the cohort and secondly, it allows the student to test their knowledge.

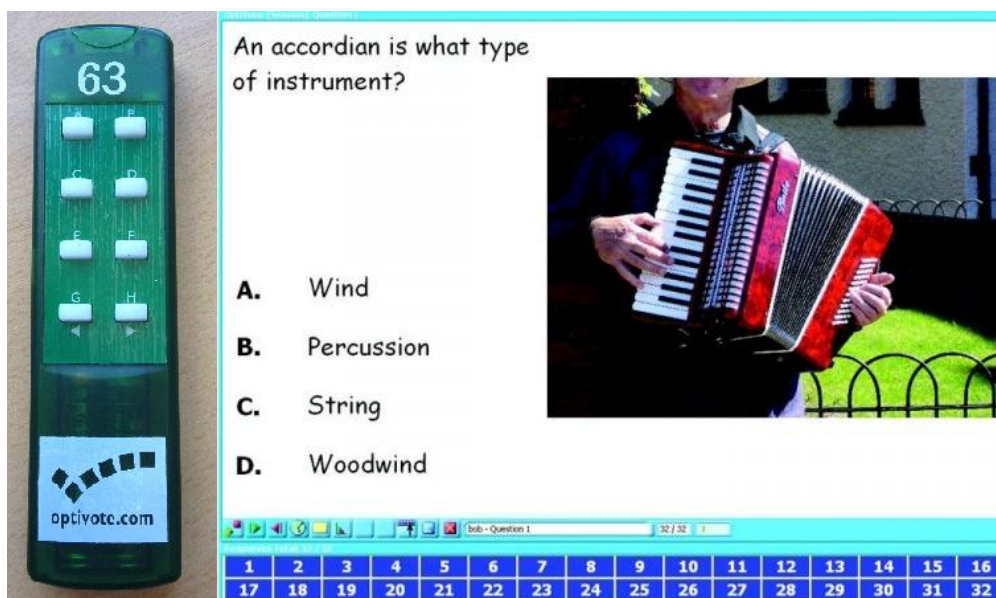


Fig. 1 - An in-class voting system. Used to allow students to select a response from predetermined questions and answers.

It is in the second part that problems arise. Without the aid of the image in the question above, a student might not know what an accordion is. This can be pre-empted by the assessor with the addition of an 'unknown' response, however there are only a finite number of response options that can be chosen. Still, for the purpose of formative assessment these response conditions could be more than adequate, and inform the assessment of the current standard of the class as a whole. However the authors feel that this type of system doesn't address the nub of the problem, as discussed by Gorsuch [5]; students need to ask questions as there may be a lack of information or missing of key points can occur.

2 FAST.Q

The main aim of FAST.Q is to provide students with a support mechanism to allow them to overcome this fear of not wishing to ask questions in class or seek clarification on points. It is hoped that through FAST.Q students can become more engaged with their subject material, feel more confident in their abilities and follow the directing policy of Student as Producer.

As such, FAST.Q is a bespoke online tool developed by undergraduate students at the University of Lincoln, UK. FAST.Q makes use of the fact that the majority of students, especially in the School of Computer Science, possess mobile technology, whether it is a laptop, tablet or smart phone device. Indeed, with the explosion in market penetration of smart phone technology [10] tools such as FAST.Q have become much more accessible. Using these mobile devices FAST.Q allows students to connect to the system and ask questions in real-time regarding the subject material, thereby providing an anonymous platform for the students to ask questions and seek clarification.

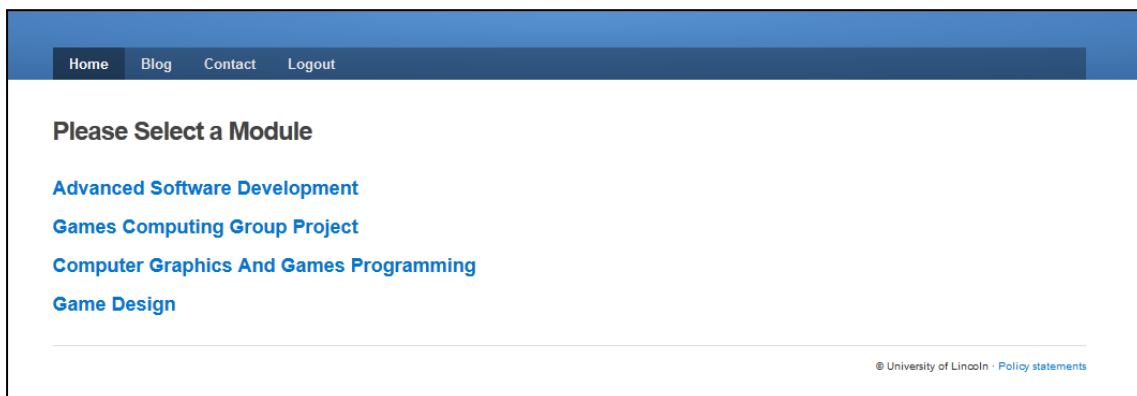
2.1 FAST.Q Interface

Upon accessing FAST.Q the system identifies a list of modules the student is enrolled on, these are then presented to the student for selection, from here they choose the module they are current in the class for and are then able to ask any freeform questions they wish. For example, a student studying Computer Graphics and Games Programming at level 2 may currently be in a lecture dealing with 'Graphics and Vectors' as a main lecture theme. As part of this lecture they could be covering some important testing techniques which the lecturer is explaining.

If a student wished to seek clarification on this topic or there was some aspect they did not quite understand, then they could use the FAST.Q system in the following way:

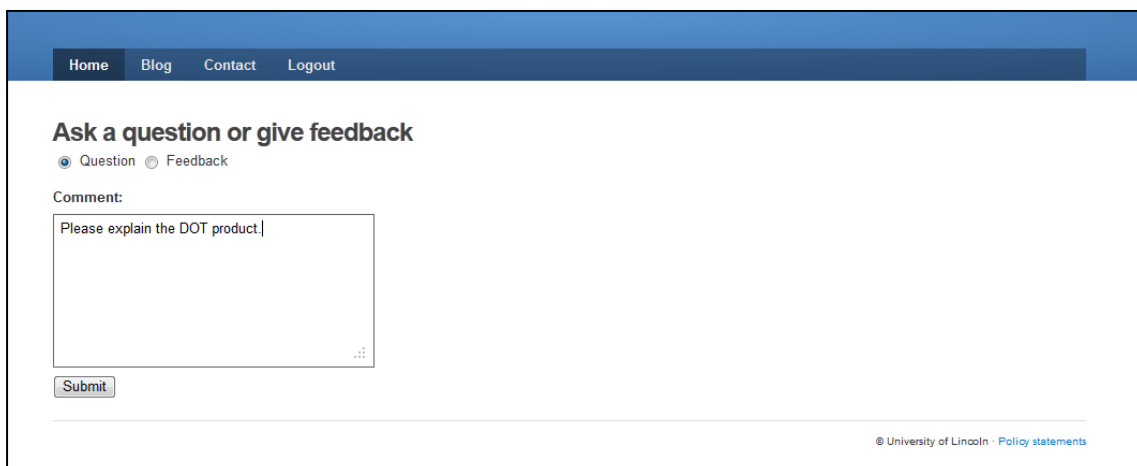
1. Using a mobile device, the student would access <http://fastq.lincoln.ac.uk>
2. log into FAST.Q and select 'Computer Graphics and Games Programming'
3. Ask their question, i.e.
 - "Please explain equivalence partitioning", or
 - "Please go over black box testing again".

Once a student has asked a question this is instantly displayed on a tablet device at the front of the lecture room. This allows the lecturer to glance at the device and respond seamlessly to any questions. In order to ensure the system is not overloaded with multiple questions that are asking for the same clarification or explanation, the system performs basic lexical analysis, stripping out pronouns and focusing on adjectives, verbs and nouns. Figure 4 shows the lecturer's display based on several questions on the same topic. Fig's 2 and 3 show the interface the students are presented with.



The screenshot shows the FAST.Q interface with a blue header bar containing links for Home, Blog, Contact, and Logout. The main content area is titled 'Please Select a Module' and lists four modules: 'Advanced Software Development', 'Games Computing Group Project', 'Computer Graphics And Games Programming', and 'Game Design'. At the bottom right, there is a footer that reads '© University of Lincoln · Policy statements'.

Fig. 2 - Student FAST.Q access screen where all of their registered modules are shown.



The screenshot shows the FAST.Q interface with a blue header bar containing links for Home, Blog, Contact, and Logout. The main content area is titled 'Ask a question or give feedback' and has two radio buttons: 'Question' (selected) and 'Feedback'. Below this is a 'Comment:' label and a text input field containing the text 'Please explain the DOT product.'. There is a 'Submit' button at the bottom left. At the bottom right, there is a footer that reads '© University of Lincoln · Policy statements'.

Fig. 3 - Student question screen used to either ask a question or leave feedback.

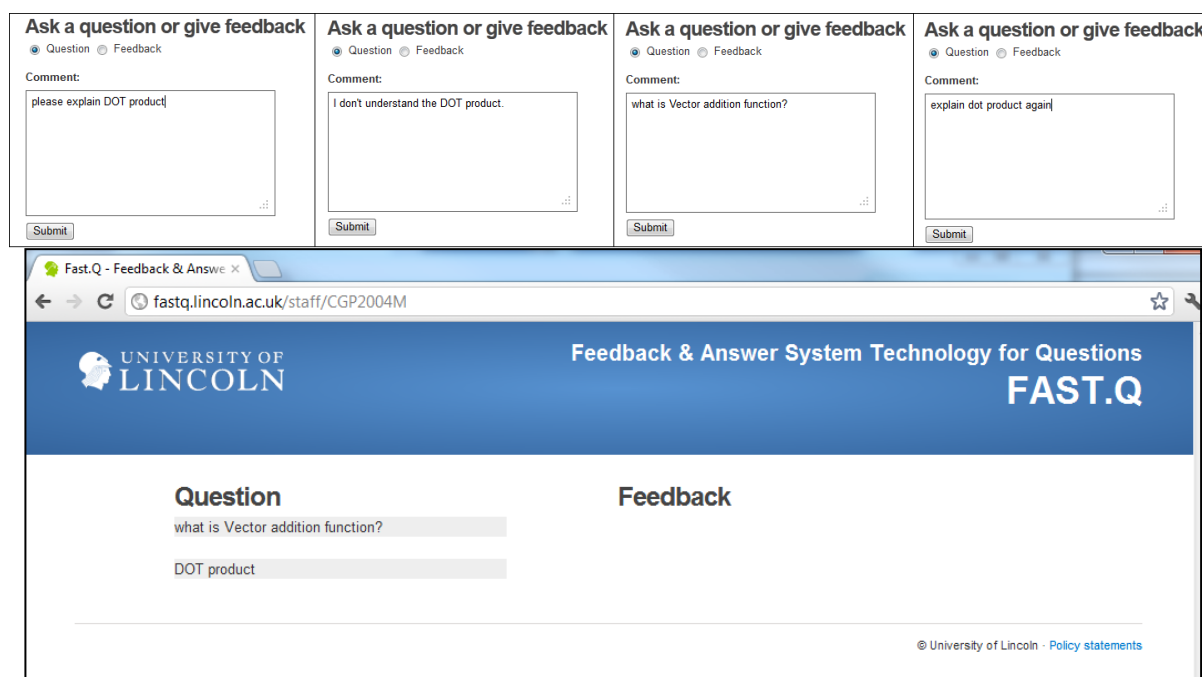


Fig. 4 - The lecturer's view of the questions asked by students.

2.2 Anonymity and OAuth

Such a system is not without its problems, and indeed during initial trials of this system one of the main concerns expressed by both students and staff was around anonymity. As previously discussed, it has been shown that one of the main issues surrounding students' unwillingness to ask questions is based on fear and embarrassment, therefore simply moving this to an online system, whilst making the questions anonymous to their peers, there is still the fear of being known by whomever manages or monitors the online system.

Ainsworth *et al* [11] discuss how research they have conducted surrounding anonymity can provide positive benefits for online voting and debating systems, however they do mention how, due to anonymity, initial off-task behaviour can occur. Ainsworth *et al* show that during initial topics 56% of participants were 'off-topic', that is posting irrelevant comments or non-conductive posts. However, they are quick to point out that by the later topics, the *off-topic* condition falls significantly to just 19%.

This effect is also demonstrated by Lapidot-Lefler *et al* [12] who explains how anonymity, invisibility and lack of eye-contact can lead to a phenomenon termed *toxic online disinhibition*. Whilst Lapidot-Lefler *et al* state that anonymity is an important contributory factor to online disinhibition, it can be shown to induce more flaming behaviours [13].

In a system whose main focus is to improve engagement and increase student's confidence in asking questions in class, reducing misuse of FAST.Q is a major priority. Flaming of students by their peers and toxic disinhibition would only serve to deter from the use of FAST.Q, detracting from the objective of increasing student engagement. With this in mind it was important to allow for the anonymous posting of questions but to reduce where possible the negative effects that result from anonymity.

FAST.Q uses two methods to take advantage of anonymity and reduce its negative impact. Firstly, the effect described by Spears *et al* [13], results as a communication between all participating students within the class, each student having access to see posts and comments by other students. However, the purpose of the FAST.Q system is to allow communication between the student and lecturer, allowing the lecturer to see questions being asked by the class and respond accordingly. As such only the lecturer can see the comments made by the students. Thus this helps to prevent any negative flaming.

However, this doesn't address the concerns expressed regarding anonymity. FAST.Q does not log or record which students have posted which questions and this is made clear to the students from the onset. This in itself brings back the concerns raised by Spears *et al* of flaming, however, not flaming the other students but the system and possibly the lecturer. As such, FAST.Q sits behind a university

secure sign-in system which is implemented using the OAuth API (<http://oauth.net>). Fig. 5 shows the university's OAuth sign-in system.

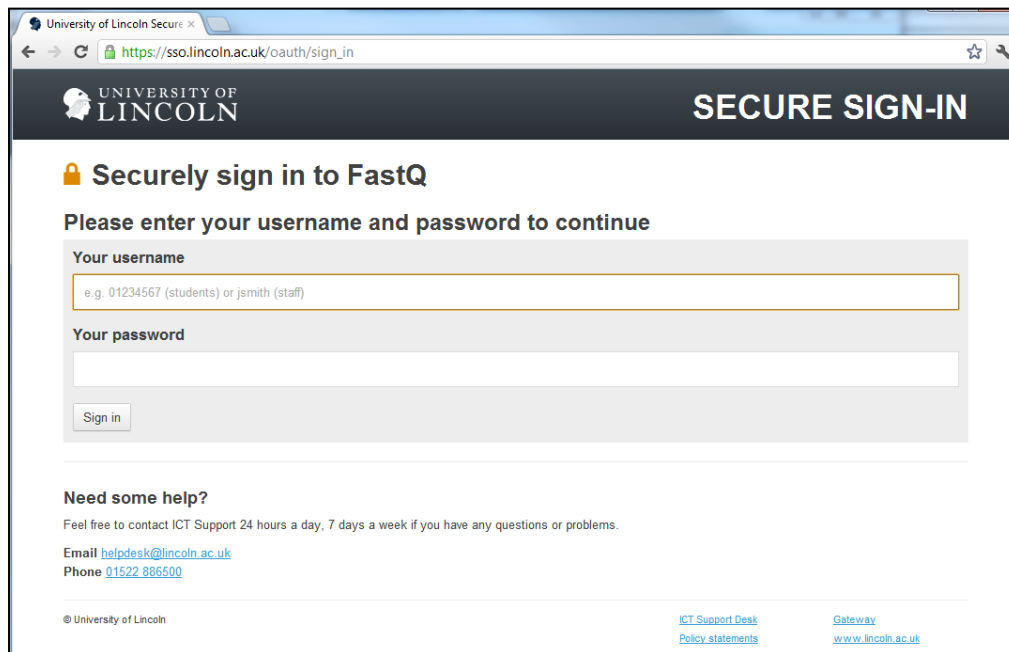
The image is a screenshot of a web browser displaying the University of Lincoln's OAuth secure sign-in page. The browser's address bar shows the URL https://sso.lincoln.ac.uk/oauth/sign_in. The page header features the University of Lincoln logo on the left and the text "SECURE SIGN-IN" on the right. Below the header, there is a section titled "Securely sign in to FastQ" with a lock icon. Underneath, a prompt reads "Please enter your username and password to continue". This is followed by two input fields: "Your username" with a placeholder example "e.g. 01234567 (students) or jsmith (staff)" and "Your password". A "Sign in" button is positioned below the password field. Further down, a "Need some help?" section provides contact information for ICT Support, including an email address helpdesk@lincoln.ac.uk and a phone number [01522 886500](tel:01522 886500). The footer contains the copyright notice "© University of Lincoln" and links to "ICT Support Desk", "Policy statements", and the "Gateway" website www.lincoln.ac.uk.

Fig. 5 - University of Lincoln OAuth secure sign-in.

The student is able to use their standard university ID and password to login to FAST.Q. From here a list of their registered modules appears for which they can ask questions, as shown in Fig. 3. The added benefit of using OAuth ensures that only registered users can access the system, whilst allowing the students to remain anonymous to the lecturer. When a question is asked this is logged in the database with a unique ID for that user. If in the unlikely event that the system was abused and inappropriate comments left, this unique ID could be provided to the university's ICT department and the student identified.

2.3 Lecture Feedback

A very important aspect of the traditional lecture format is gaining feedback on your lecture to ensure you are utilising available resources appropriately, delivery methods are adequate and content is well presented. Teaching is certainly something that can improve with time and guidance and there are many techniques for improving teaching methods and ensuring one becomes an effective educator. There are many processes for supporting this, and predominately this takes the form of formal evaluation in some manner. Sullivan and Wircenski [14] discuss the use of an observer to observe and provide formalised feedback, which is more commonly known as peer observation and is a process used by the majority of universities. Other techniques can take the form of self-evaluation by recording lectures and watching these through. However, in order to evaluate appropriately it is best to ask those on the receiving end of the lecture, i.e. the students.

There are many methods of achieving feedback from students, both formally and informally, but they usually take the form of questionnaires given to students at the end of a semester. This can be an effective way to improve delivery, but only for successive cohorts of students. As such, the cynical student may be reluctant to complete such forms, without receiving direct benefit. Thus, in addition to the use of FAST.Q for allowing students to ask questions, there is also the option to provide lecture feedback.

If the student ticks the 'Feedback' radio button, this allows for them to provide anonymous feedback to the lecturer regarding the lecture session, or indeed the module in general. This allows for real-time feedback, enabling the lecturer to act upon this before the end of the module, and even if the case arises, before the end of the lecture. As such, students can see a more direct benefit to using this system as it impacts them directly.

3 DEPLOYING FAST.Q

The FAST.Q system as an artefact was developed by undergraduate students in the academic year 2011/12. The system has recently only just reached completion and as such has not been deployed for an entire module's duration. The system will, however, be deployed in several modules within the School of Computer Science at the University of Lincoln, UK, in the academic year 2012/13.

3.1 Fast.Q for Feedback

In its initial test stages in the previous academic year a trial system was deployed for several weeks in two modules, preliminarily to determine whether a live feedback and question system would be a viable tool. As such several sets of questions, and several feedback comments were posted on the initial system. As discussed by Lapidot-Lefler *et al* [12] due to total anonymity and lack of an OAuth interface, the initial system did indeed suffer from toxic online disinhibition. However, several on-topic comments were made. Below is a list of the on-topic comments provided by cohort of students testing the system and providing lecture feedback.

Feedback comments (these have been corrected for grammar and spelling):

- Can't see the projector at the back
- Too many people talking
- Cannot hear you
- Please turn front light off, washing out the projector

Whilst these are only a sample of the more sensible pieces of feedback, they are important factors that can be addressed directly. In particular students may not wish to speak aloud regarding other students talking however, this can have a detrimental effect on their learning, with such an anonymous system this can be dealt with.

3.2 Fast.Q for Questions

In the same cohort of students who provided the lecture feedback, several questions were also asked via the system. These questions were predominately around the same aspect of this particular lecture's content, which demonstrated that this current topic was either poorly explained on the slides or the students were struggling with the concepts. Irrespective of the rationale behind the questions, it was important that the students sought clarification, so that the topic could be explained in more detail, ensuring understanding.

Whilst this type of question system does not solve all understanding problems, in this particular instance it did allow for clarification to be made to students. Although, after this clarification questions on the same topic were being asked, this allowed an additional focus for this topic to be dealt with in more detail in the following workshop.

4 CONCLUSION

This paper has presented a novel Feedback and Answer System Technology for Questions (FAST.Q), an online tool for use by students to ask anonymous questions and seek further clarification of lecture topics in real-time. Whilst this full system has not yet been fully deployed for an entire semester and cohort of students, preliminary trials have been carried out. These trials have shown that the FAST.Q system is a viable method of communication within the traditional lecture environment.

The trials have shown that the system can be easily and successfully used to allow students to ask questions or provide lecture feedback, both of which can be addressed instantly and directly by the lecturer. As such, FAST.Q is scheduled to be fully tested and trialled for the academic year of 2012/13.

5 ACKNOWLEDGMENTS

FAST.Q was funded in part by the LNCD project - <http://lncd.lincoln.ac.uk>, and the Student as Producer project - <http://studentasproducer.lincoln.ac.uk>.

The FAST.Q system and online blog can be accessed at:

<http://fastq.lincoln.ac.uk>

<http://fastq.blogs.lincoln.ac.uk>

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